Stratomaster Maxi Single

TP-2

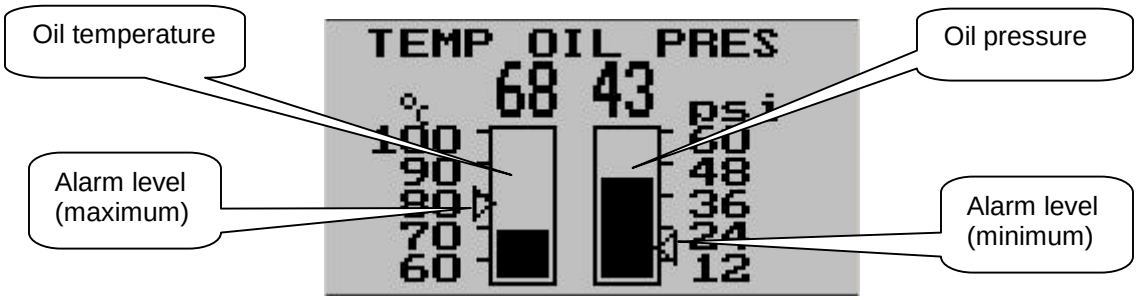
Combined
Oil or fuel pressure gauge
Oil or Coolant temperature gauge

The TP-2 Temperature/Pressure gauge is a 3.5” instrument intended for display of either the following selections:
Oil temperature, Coolant temperature, Oil pressure, Fuel pressure, Oil temperature and Oil pressure, Coolant temperature and Fuel pressure, Oil temperature and Fuel pressure.

The TP-2 gauge can be programmed by the user for a variety of temperature/pressure ranges and can be adapted to many types of senders, both for temperature and pressure.
Temperature can be measured using standard NTC senders as well as the MGL semiconductor sensors.
Pressure can be measured using standard VDO automotive senders as well as linear pressure transducers.
Both temperature and pressure can activate a programmable alarm. This results in a contact closure that is typically used to switch a warning lamp.

The main display

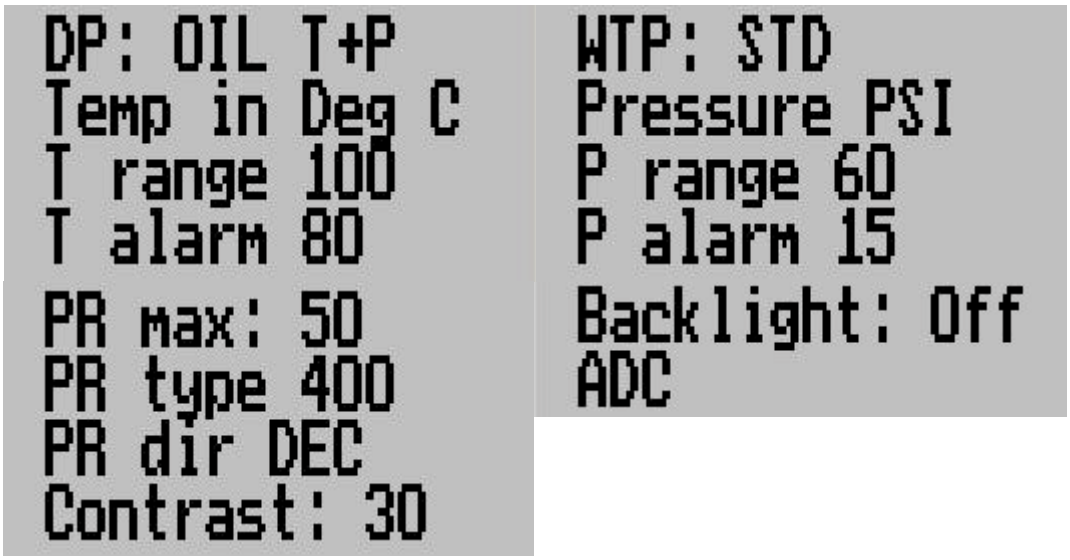
The display can be configured in one of seven modes. Here we use the combined oil temperature and oil pressure display as example.



Setting up the TP-2

Press the Menu key to enter the menu. You can move forward and backwards in the menu by using the + and – keys. To change or select a menu item, move the highlight to the desired item and then press the Select key. To end an edit or function, press the Menu key again.

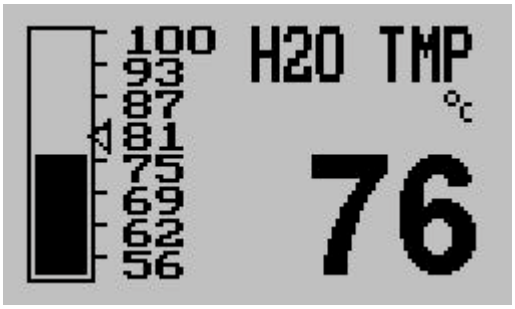
To exit the menu and continue normal operation, press the Menu key.
Note, all changes you have initiated during your session will only be remembered by the instrument if you exit the menu.



Listing of all available menu functions. These are described in detail on the next pages.

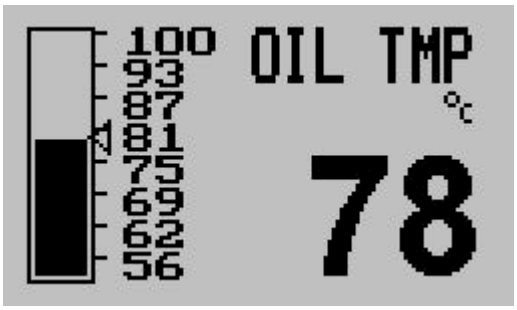
DP: ….

Use this function to setup how you want to use your TP-2. You have a choice of seven basic modes of operation. These are:



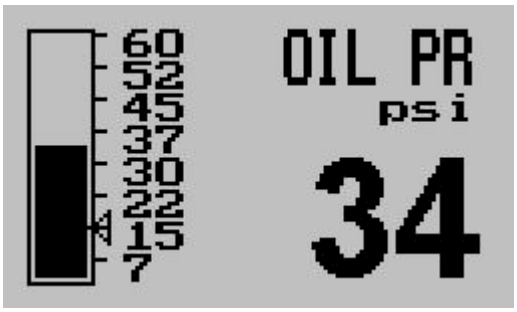
Coolant temperature, usually water temperature of your water cooled engine.

Uses standard NTC senders or semiconductor senders available from MGL Avionics.



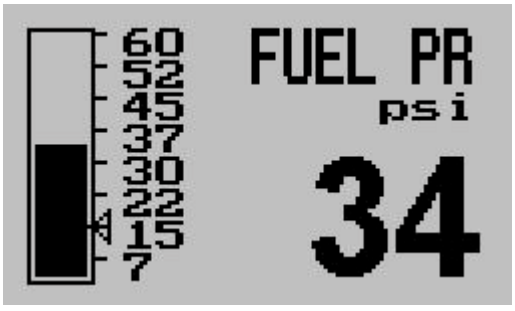
Oil temperature. Usually the temperature of the oil in your sump (crankcase).

Uses standard NTC senders or semiconductor senders available from MGL Avionics.



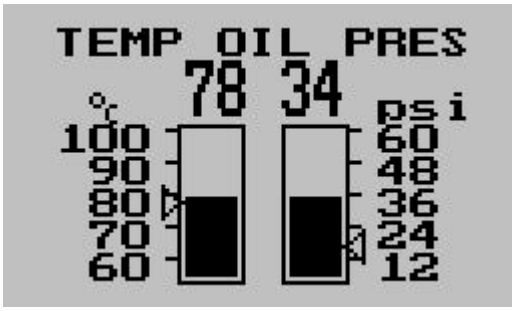
Oil pressure. The pressure of your oil supply as measured after the oil pump / pressure regulator.

Uses standard automotive pressure senders such as available from VDO.

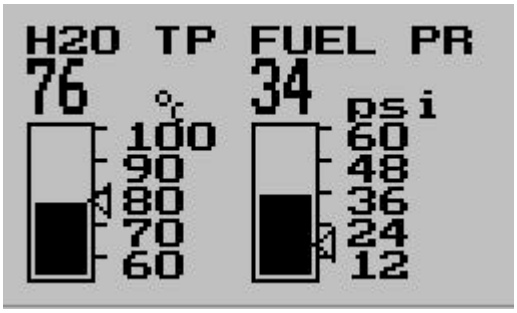


Fuel pressure. The pressure of your fuel supply as measured after the fuel pump and pressure regulator (if any).

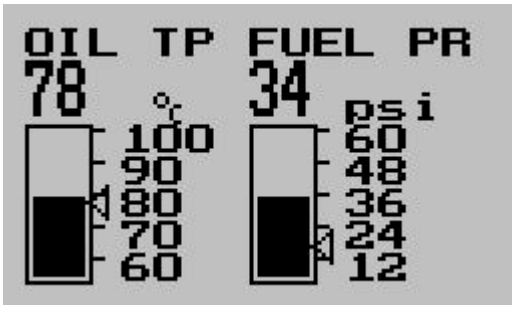
Normally uses standard VDO pressure senders with fuel isolation kit available from VDO.



Combined oil temperature and oil pressure display. Most oil sump or dry sump lubricated engines require monitoring of both oil temperature and oil pressure making this option very valuable.



Combined coolant temperature and fuel pressure display. A suitable choice for many water cooled engines.



Combined oil temperature and fuel pressure display.
This is probably a rare choice given the options above.

Temp in…

Choose if you want your temperatures displayed in degrees Celsius or degrees Fahrenheit.

T Range …

Choose the range (maximum value) that you want to display on your temperature bargraph. You should select a value that is just larger than the maximum temperature you expect to never exceed.
Note that the bargraph always starts indicating at ½ your selected maximum range. For example, assume you have selected 100 degrees as maximum value. The bargraph will start indicating from 50 degrees.

T Alarm …

Select the alarm level you want to use for the temperature indication. The alarm level will be marked with a small triangle on the display if you choose a value that is within range of the bargraph. If you do not want to use the alarm, select a value that is higher than will be reached.

WTP …

Select the type of sender you will be using for the water or oil temperature. You can choose either NTC senders (standard automotive) or MGL semiconductor probes.
Standard senders are indicated by the choice “STD” and the MGL probes by “PRC”.
Please note that the type of NTC sender depends on your choice of measuring water or oil temperature.
Also note that incompatible probes may result in incorrect temperature readings.

Pressure …

Select if you would like your pressures to be indicated in “bar” or “psi”.

P Range …

Choose the range (maximum value) that you want to display on your pressure bargraph. You should select a value that is just larger than the maximum pressure you expect to never exceed. The pressure bargraph starts indicating at zero pressure. Note that for most senders this would be equivalent to one bar (atmospheric pressure) at sea level.

P Alarm …

Select the alarm level you want to use for the pressure indication. The alarm level will be marked with a small triangle on the display if you choose a value that is within range of the bargraph. If you do not want to use the alarm, select a zero value.
Note that the alarm will be activated if pressure is BELOW your chosen level.

PR Type …

Select the type of pressure sender you are using.
VDO automotive pressure senders and similar types are resistive senders. You can select the resistance value in steps of 50 ohms from 50 ohm to 1000 ohm.
The resistance relates to the resistance of the sender in Ohms at maximum pressure or minimum pressure depending on the “direction” of the sender (select in PR DIR below).

In addition, you can select linear sensors. During the selection these are marked by the word “bar” after the value. You can select from 1bar to 10bar. Linear sensors typically are amplified semiconductor types. The instrument accepts a voltage reading from the sensor of 0V to 5V corresponding to zero pressure to the value to have selected.

PR Max …

Enter the maximum Pressure reading for your sender. Most senders have a 10 Bar rating, some models go to only 5 Bar.

If your senders resistance increases with pressure, enter the pressure that the sender will be exposed to if a resistance equal to the value you have entered above is reached.

If your senders pressure decreases with pressure, this is the pressure that should be indicated if the sensor reads close to zero ohms resistance. As the sensor reaches the resistance entered above, a pressure of zero is assumed.

Note: This setting is only relevant for resistive type pressure senders.

PR DIR

Select if your oil pressure senders resistance increases or decreases with pressure.
Most senders increase resistance as pressure increases but there are some models available that operate inverse to this.

Typical oil pressure sender setup:

The oil pressure sender used in Rotax 912 engines is typical for most senders. This sender requires the following setup:

PR Res: 200
PR Max: 10.0
PR DIR INC

Contrast …

This function allows you to change the display contrast to your liking. You can select values from about 20 to 45. (can vary depending on display type).

Backlight …

This function allows you to switch the display backlight on or off.

ADC

This function is for technical personal. It is not used during normal operation of the instrument.

Operating the alarms

If any alarm is activated, the corresponding item on the display will flash (either the temperature reading, pressure reading or both).
At the same time the externally available alarm contact will close. The contact will remain closed until either any button is pressed to acknowledge the alarm or until the condition(s) that activated the alarm no longer exist.
The external alarm contact can be used to switch an alarm indicator. The contacts are potential free allowing the contact to be used in existing indicator panels.
It is possible to wire the alarm contacts of several smart singles in parallel should this be desired.

Technical specifications:

Display temperature range (operational): -20 to +80 degrees C
Supply voltage: +8 to +18V. +24/28V with optional pre regulator.
Supply current: 35mA/60mA (backlight off/on)

Temperature sensors:
MGL NTC Water temperature: 900 Ohms at 20 degrees C and 93 ohms at 85 degrees C.
MGL Precision semiconductor: Based on National Semiconductor LM335.
Oil temperature: Resistance of 1000 ohms at 20 degrees C and 100 ohms at 85 degrees C. (fitted as standard to Rotax 912/914 engines).
Westach types 399: (specifications from Westach document)
32 deg F = 9800 ohms
70 deg F = 3570 ohms
100 deg F = 1740 ohms
212 deg F = 212 ohms

Pressure sensors:
VDO, range 50 to 1000 ohms, 10 bar. Rotax 912/914 standard sender is 200 Ohms.
VDO senders used to measure fuel pressure require the fuel isolation kit available from VDO.
Linear types from 1bar to 10bar. 0V-05V range, pull-up resistor in instrument is 1K5 to 5V.

Weight: 90 grams.

Warranty:
MGL avionics warrants their products for a period of one year from date of purchase against faulty workmanship. Warranty is limited to the replacement of faulty components and includes the cost of labor. Shipping costs are for the account of the purchaser.

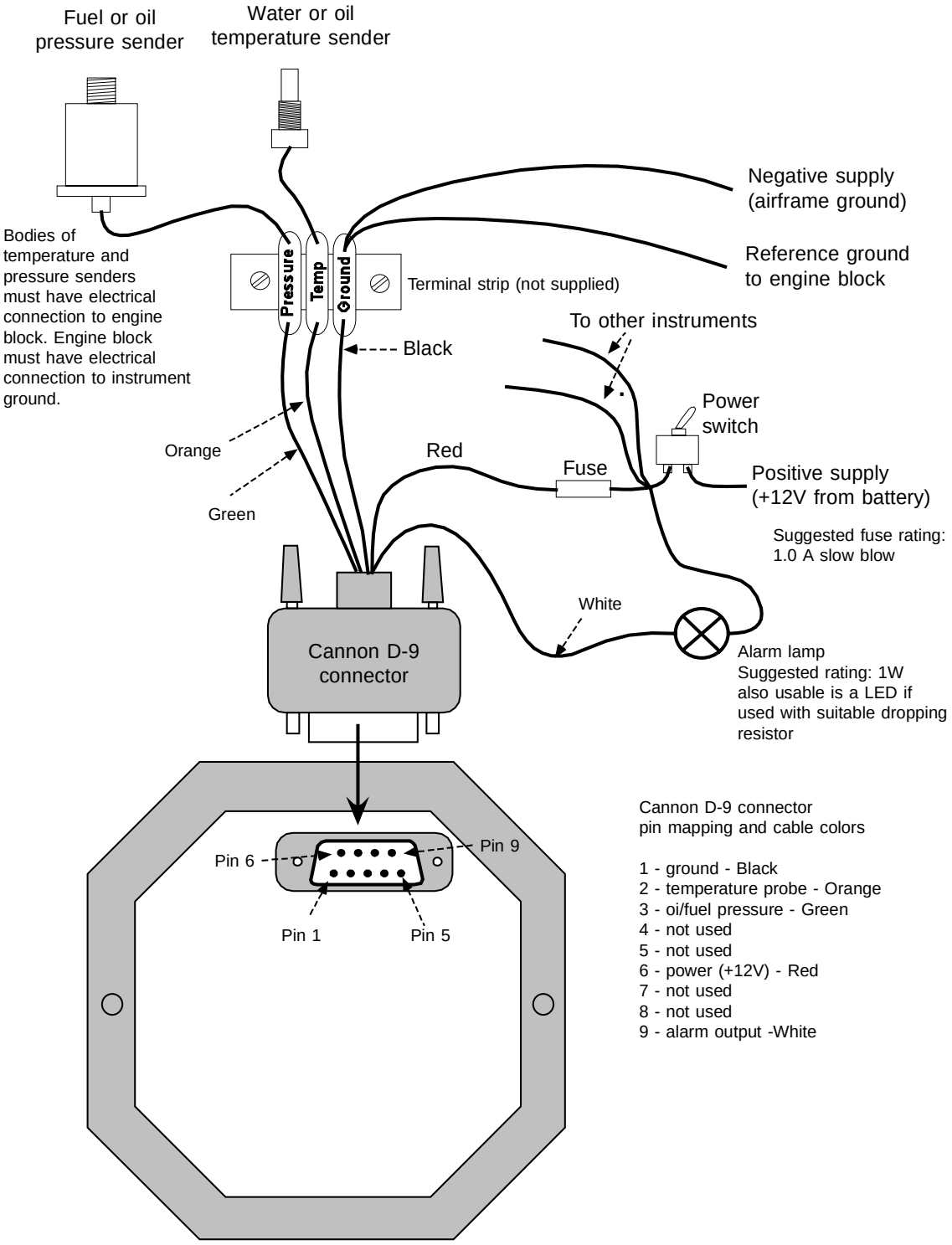
Note for operation on supplies with inductive loads:

Any operation of electronic instrumentation on power supplies that are subject to high voltages caused by operation of inductive loads (starter motors, solenoids, relays) are required to be fitted with suitable protection.
All Smart Singles are guaranteed to withstand temporary over voltage up to 40V without additional protection. We recommend that measures are taken to prevent voltage transients in excess of this limit.
MGL Avionics recommends the fitment of a fuse in line with a 33V transorb (available from MGL Avionics at low cost) to protect electronic instruments, radios and intercom systems. Only one such arrangement is required for a cluster of instruments.
Please note that product warranty excludes damages caused by unprotected, unsuitable or incorrectly wired electrical supplies.

This instrument is not certified by the FAA. Fitting of this instrument to certified aircraft is subject to the rules and conditions pertaining to such in your country. Please check with your local aviation authorities if in doubt.
This instrument is intended for ultralight, microlight, homebuilt and experimental aircraft.

Operation of this instrument is the sole responsibility of the pilot in command (PIC) of the aircraft. This person must be proficient and carry a valid and relevant pilots license. This person has to make him/herself familiar with the operation of this instrument and the effect of any possible failure or malfunction. Under no circumstances does the manufacturer condone usage of this instrument for IFR flights.

Installing the TP-2



Cannon D-9 connector
pin mapping and cable colors

1 - ground - Black
2 - temperature probe - Orange
3 - oi/fuel pressure - Green
4 - not used
5 - not used
6 - power (+12V) - Red
7 - not used
8 - not used
9 - alarm output -White

Connect the supply terminals to your aircraft's power supply (you need a dropping resistor or pre-regulator for 24/28V systems).
Install suitable power supply protection if you have a supply that can contain large voltage transients such as can be created by starter motors and solenoids.

Ensure that the supply voltage will not drop below 8V during operation as this may result in incorrect readings.
Install a suitable alarm lamp. Typically this would be a 12V/1W panel mount lamp (pilot lamp) available as accessory in most automotive supply shops.

Temperature senders

Four types of sender can be fitted:

Water temperature senders (NTC types). A suitable sender with the same thread used by Rotax can be obtained from MGL Avionics. If you source your own sender, ensure that it has the following characteristics: 900 Ohms at 20 degrees C and 93 ohms at 85 degrees C.

Oil temperature senders (NTC types). A standard automotive sender as fitted by Rotax to 912/914 engines can be used. It has the following characteristics: Resistance of 100 ohms at 85 degrees C and 1000 ohms at 20 degrees C.

MGL Precision senders: These are senders containing a semiconductor temperature measurement device. They can be used for water or oil temperature. These senders are available in two types: An encapsulated version with a brass housing suitable for Rotax thread. A second uncommitted version contains only the sensor itself. This can be conveniently mounted inside an existing sender housing after you remove the original insides of the sender. This is intended to give you a solution for unusual or difficult to obtain senders.

Westach NTC temperature senders type 339.

Most NTC senders require a single wire connected as shown. The sender is grounded via the engine block. The ground terminal of the gauge input should be connected to the engine block. Some NTC senders have two wires. In this case it is not required that the sender housing itself is connected to the engine block. Wire the second wire as indicated (dotted line).

Pressure senders

Pressure senders come in two basic varieties. The first are the automotive types (for example from VDO), the second are the electronic types with linear output.
Most pressure senders used for engines are piezo-resistive types. These tend to have a very low resistance at low pressures and a high resistance at their maximum pressure output. The resistance is approximately linear with pressure. The TP-2 will support both increased resistance with pressure as well as decrease resistance with pressure types.
The TP-2 allows you to choose the pressure sender type as described in the relevant section of this manual. Most automotive types have resistance ranges from 200 to 400 ohms. For example the oil pressure sender as installed in a Rotax 912/914 engine has a 200 ohm resistance for 10 bars pressure.
Linear output senders that can be used with the TP-2 are those types that have their maximum output voltage of 5V at their maximum pressure output. This can be selected in the TP-2 from 1 to 10 bars.
Senders can have either one or two wires, the two wire senders need one connection to ground. Wire them up as indicated in the drawing (dotted line as ground terminal).
Please note that two wire senders may be sensitive to polarity. One of the two wires is a dedicated ground terminal that has to be connected to ground (minus of the battery or engine block).

Senders that are grounded in the engine block

Single wire senders require that their mounting arrangement (thread) has a very good electrical contact with the engine block. Avoid the use of any sealant or tapes as these may cause a bad electrical connection.
Further to this it is very important that the engine block has a good electrical connection to the negative supply terminal of the TP-2. Any voltage drop caused by other equipment on the ground wire will cause incorrect readings. The best way to ensure a good connection is to wire a single connection between the TP-2 ground terminal (any of these terminals) to the engine block. Don't wire this anywhere else and do not allow any other equipment to use this wire as a current return path.